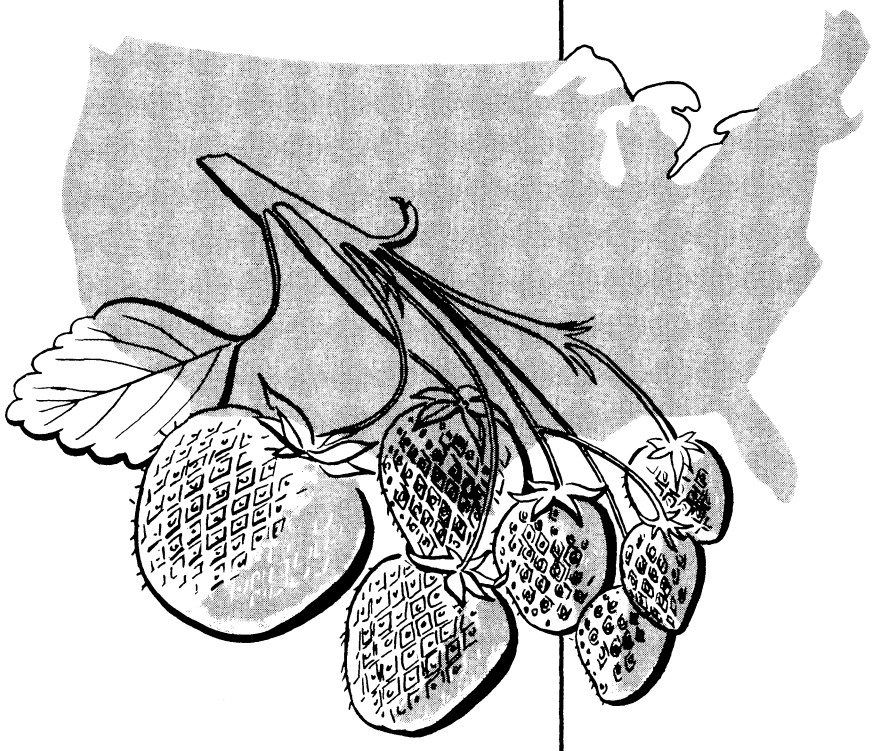
STRAWBERRY VARIETIES

in the UNITED STATES



Farmers' Bulletin No. 1043

U. S. DEPARTMENT OF AGRICULTURE

This bulletin describes the more important varieties of strawberries. It tells which varieties are most desirable for such purposes as shipping, preserving, and freezing, and which are best suited to various climates and soil conditions. It is intended to help both home garden and commercial strawberry growers select varieties.

Information is based on experience of successful growers in every important commercial strawberry-producing region, on results of tests conducted at agricultural experiment stations, on experience of commercial processors and manufacturers of byproducts, on preferences of amateur fruit gardeners, and on the authors' personal observations.

For further information about strawberry varieties and strawberry culture, see Leaflet 414, Reducing Virus and Nematode Damage to Strawberry Plants, and the following Farmers' Bulletins: 901, Everbearing Strawberries; 1026, Strawberry Culture: South Atlantic and Gulf Coast Regions; 1027, Strawberry Culture: Western United States; and 1028, Strawberry Culture: Eastern United States. (Farmers' Bulletins 901 and 1027 are out of print but are available in libraries in most large cities.)

Contents

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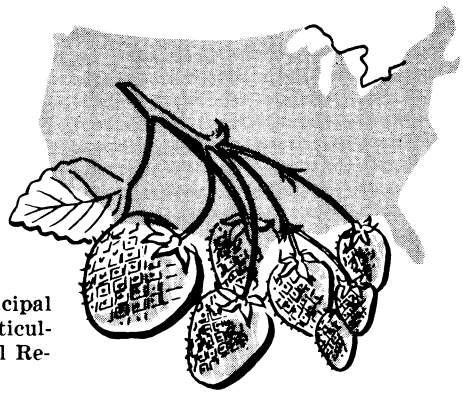


By GEORGE M. DARROW [1] and D. H. SCOTT, principal horticulturists, and GEORGE F. WALDO, horticulturist, Crops Research Division, Agricultural Research Service

The strawberry is the most widely grown small fruit in the United States. It is grown on a large scale for market in many localities and in home gardens throughout the country. Commercial and home crops have an annual value of about $40 million.

In 1955, 17 main varieties made up about 98 percent of the commercial acreage. They are listed in the order of number of acres planted. Approximate percentage of total acreage for each variety is given.

Variety:	*Acreage (percent of total)*
1. Blakemore	22
2. Marshall	15
3. Northwest	10
4. Howard 17 (Premier)	9
5. Shasta	8
6. Robinson	6
7. Klonmore	6
8. Catskill	4
9. Tennessee Beauty	4
10. Sparkle	3
11. Lassen	3
12. Florida Ninety	2
13. Temple	1
14. Albritton	1
15. Pocahontas	1
16. Klondike	1
17. Fairfax	1
18. Dunlap	1
Other (includes Missionary, Fairland, Dixieland, Aroma, Redstar, and Gem)	2
Total	100

[1] Retired March 31, 1957.

Testing New Varieties

Modern strawberry varieties have been derived mainly from two American species—the wild meadow strawberry [2] of eastern North America and the beach strawberry [3] of the Pacific coast area. In recent years, the western field strawberry,[4] also an American species, has been used in breeding new varieties.

Since about 1920, more than 875,000 different seedling varieties have been raised at the Agricultural Research Center of the U. S. Department of Agriculture, Beltsville, Md. Only 24 of these varieties were named—about 1 in 36,000. Other breeders in various parts of the United States also raise large numbers of seedlings.

The best new seedlings are introduced as new varieties, but during extended trials they may show some undesirable qualities.

Therefore, test new varieties before planting them extensively. Plant new varieties beside standard varieties at the same time; give both

[2] *Fragaria virginiana.*
[3] *F. chiloensis.*
[4] *F. ovalis.*

the same treatment. Discard new varieties if they are not equal to standard varieties. Usually, a 2- to 3-year test will allow new varieties to prove their value.

Adaptation to Climate

The interrelation of temperature and length of daylight largely determines how well a variety adapts to a particular area. Environment affects productivity of plants; size, flavor, and firmness of fruit; and development of diseases.

Southern Varieties

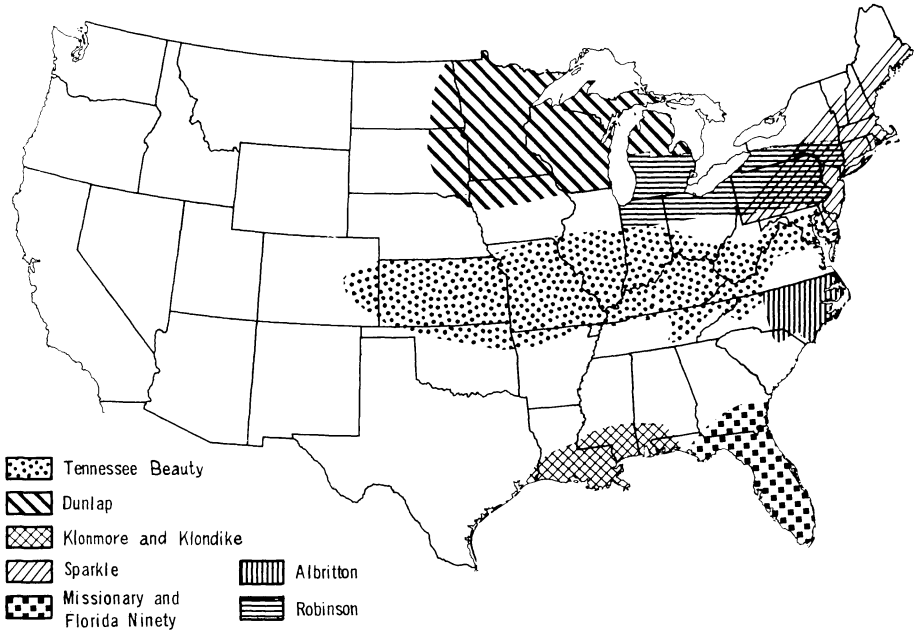
Varieties adapted to Southern States need little or no winter rest period. They grow vigorously and form fruit buds freely during the short days and relatively low temperatures of late fall, winter, and early spring.

Of the southern varieties, Florida Ninety and Missionary require the least rest and cold weather; Blakemore requires the most. Klonmore, Klondike, Albritton, and Massey are adapted to mild winters. These varieties also can withstand high temperatures during the growing season.

Blakemore is the leading variety in most of the South. However, Florida Ninety and Missionary are favored in Florida, Klonmore in Louisiana, and Albritton in eastern North Carolina. Tennessee Beauty succeeds from Missouri to Maryland.

Northern Varieties

Most northern varieties need a cold rest period. They are dormant



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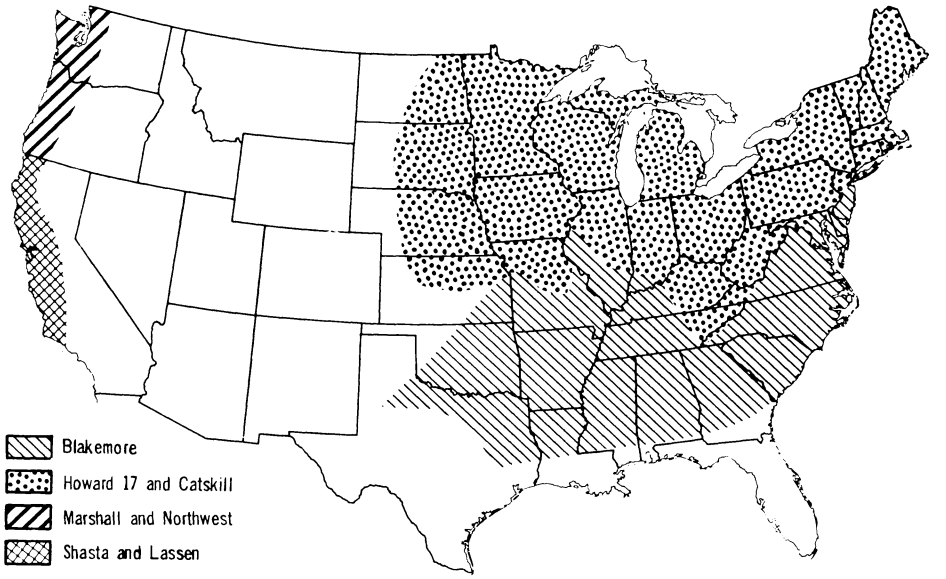
Map showing the regions in which Tennessee Beauty, Dunlap, Klonmore, Klondike, Sparkle, Missionary, Florida Ninety, Albritton, and Robinson are grown profitably. Missionary grows in some other districts but is recommended only for the region indicated. Blakemore has largely replaced Klondike and Missionary from 50 to 100 miles above the Gulf of Mexico and northward.



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Map showing the regions in which Blakemore, Howard 17 (Premier), Catskill, Marshall, Northwest, Shasta, and Lassen are grown extensively.

or grow very little during short days and low temperatures. Longer days break the rest period of some varieties; temperatures below 45° F. break the dormancy of all varieties.

Howard 17 (Premier), Robinson, Sparkle, and Catskill are the most widely grown varieties in Northern States.

Six varieties have been bred to withstand the low temperatures of the Great Plains—Early Cheyenne 1, Cheyenne 2, Cheyenne 3, Sioux, Arapahoe, and Radiance. These varieties must resist temperatures as low as −40° F. without snow cover. In Montana, Wyoming, and the western parts of North Dakota, South Dakota, and Nebraska, they are the only hardy varieties.

Most varieties cannot withstand the cold, dry winters of the upper Mississippi Valley where Dunlap and Beaver grow well.

Other climatic conditions, which are not fully understood, limit production of some western varieties in the East and some eastern varieties in the West.

Effect of Temperature

Dessert Quality

Climate and local weather conditions affect dessert quality of strawberry varieties. Dessert quality varies greatly from season to season in the same district; often it improves toward the end of the season.

In New York and New England, Howard 17 (Premier) develops better quality than in Maryland. Marshall, Fairfax, Fairpeake, Midland, and Empire are good dessert varieties when grown in the North.

Flavor

Temperature greatly affects flavor of strawberries. In general,

varieties grown where there are sunny days and cool nights have better flavor than those grown where there are cloudy, humid days and warm nights.

Albritton and Massey are exceptions; they develop high flavor in the warm climate of the ripening season in eastern North Carolina. In the cool weather of Oregon and Washington, Marshall develops much better flavor than in Maryland. Suwannee develops high flavor under a wide temperature range; in Eastern States, its flavor excels that of all other varieties.

Firmness

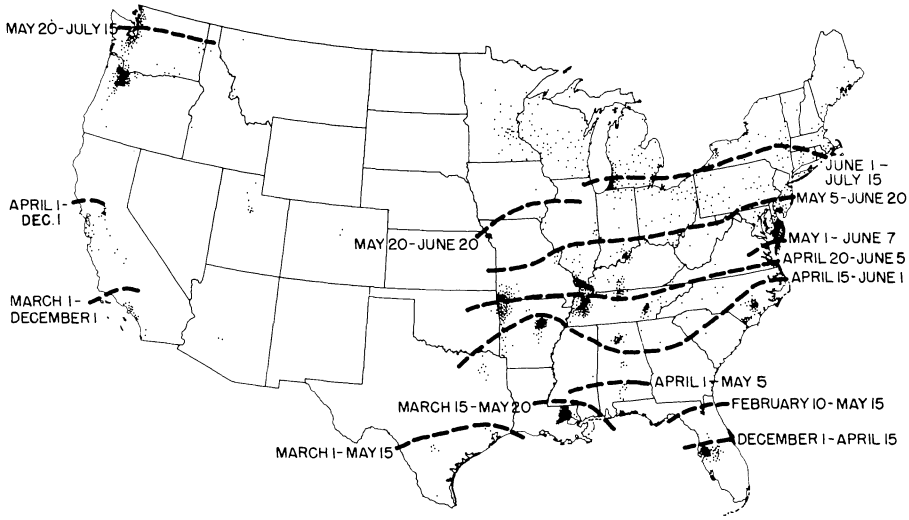
Most varieties produce firmer fruit in cool temperatures. In New York and Michigan, Howard 17 (Premier), Catskill, Robinson, and Sparkle produce a firmer fruit than they do farther south, and are the leading varieties. In Maryland, they are too soft for shipment. During warm, humid weather, they may be impossible to harvest for marketing.

Ripening Season

The ripening season of strawberry varieties is influenced by climate, local weather conditions, exposure, soil, and cultural practices.

Weather affects the length of the ripening season. In cool weather, a variety that ordinarily is early or ripens quickly may be late or have a season extending over several weeks.

In California, largest acreages are near the coast where temperatures are modified by the ocean. Flower buds form normally and plants fruit throughout the summer in cool temperatures of the middle coastal area. Many of the same varieties produce only one crop in other areas. In Massachusetts, Shasta and Lassen's fruit matures in June; in the central coastal area



Map showing the location of the principal commercial strawberry-producing regions, the approximate ripening time in each region, and the northward progression of the strawberry season.

of California, it begins maturing in April and continues through November.

Varieties may be classified by their ripening season as follows:

Very early:
- Earlidawn
- Midland
- Stelemaster

Early:
- Blakemore
- Dixieland
- Howard 17 (Premier)
- Missionary
- Klonmore
- Klondike
- Florida Ninety
- Pocahontas
- Fairland

Midseason:
- Fairfax
- Catskill
- Marshall
- Shasta

Late midseason:
- Armore
- Robinson
- Empire
- Aroma

Late:
- Sparkle
- Tennessee Beauty
- Northwest
- Albritton
- Fairpeake

Very late:
- Redstar

Frost Injury

Strawberry varieties may escape frost injury if they blossom after most danger from frost has passed or if they have short flower stems and flowers that are under protecting leaves. Varieties that have a long flowering season develop some fruit despite frost.

Howard 17 (Premier) is damaged less by frost than other standard varieties; its flowers are protected by leaves. Although early, it has a long flowering season and grows relatively large berries from flowers that are not injured by frost. The new variety, Earlidawn, seems even more frost resistant than Howard 17 (Premier). The flowers of Tennessee Beauty, Sparkle, Armore, Redstar, and Vermilion are late blooming and also are protected by leaves.

Varieties that escape frost more often than most are Midland (early flowering), Pocahontas, Dixieland, Fairland, Bellmar (second early flowering), and Catskill (midseason).

In the North wherever frosts are unusually serious, everbearing strawberries are commonly grown instead of the ordinary spring-fruiting varieties. If their first blossoms are killed, everbearers produce a new set of flower buds.

Vitamin C Content

Fresh strawberries are an excellent source of vitamin C. More vitamin C is in a cupful of strawberries than is in a medium-sized orange or half of a medium grapefruit.

Fresh, high-flavored, undamaged fruit generally contains more vitamin C. Preserving or freezing may destroy 1/6 to 1/2 of the vitamin C content.

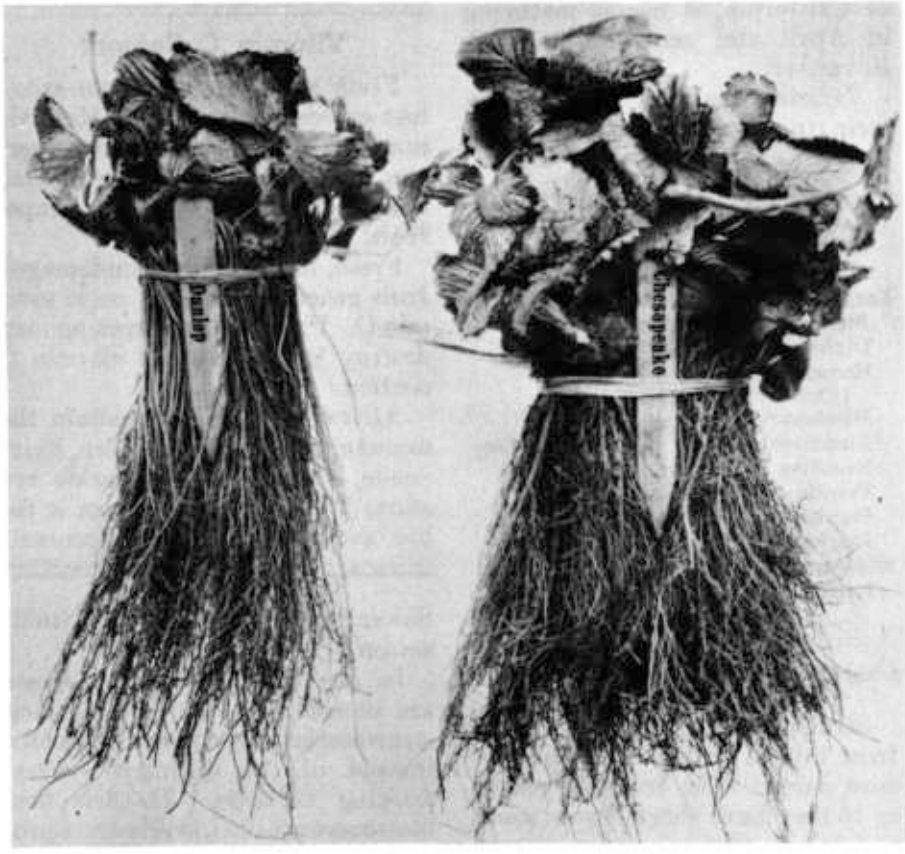
All varieties do not contain the same amount. Catskill, Eden, Fairpeake, Marshall, and Sparkle are above average and Aberdeen is below average in vitamin C content.

Soil and Moisture

Strawberry varieties respond differently to soil fertility. The amount of moisture the roots of a variety can absorb also determines soil adaptation. On page 8 the great differences in size of root systems and crowns of varieties are shown.

If the soil is fertile and there is ample moisture, varieties such as Blakemore and Dorsett may grow so dense that they produce few berries. However, they yield a large crop when runners are removed after a full stand of plants, spaced 9 to 12 inches, have rooted.

Blakemore, Howard 17 (Premier), Catskill, and Dunlap are



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Bundles of Dunlap and Chesapeake plants showing the differences in their crowns and root systems. Each bundle contains 27 plants of average size.

adapted to a wide range of soil types. Aroma is not so adaptable and grows best in heavy silt loam.

Certain varieties, such as Midland, need irrigation as well as extremely fertile soil to produce excellent stands and large, profitable crops.

Excessively dry climates may reduce fruit yields, size, and attractiveness. Marshall is drought-resistant and is widely grown in dry areas of Oregon and Washington. On elevated, relatively dry sites, it is grown in hill systems or narrow matted rows. In valleys, particularly where irrigation is available, it is grown in heavy matted rows.

Northwest, which is partly replacing Marshall, is usually grown in valley sites where moisture is more uniform.

Fruit Production

Growth Habit

Growth habit of a strawberry variety largely determines its value.

Howard 17 (Premier) and Dunlap have the best types of growth for Eastern States. Normally, they

produce irregular low-branching flower clusters. If the first flowers are killed by frost, later-opening flowers develop large berries. In the South, Missionary and Klondike have similar growth habits.

In California, some varieties produce few berries per cluster but the berries are large, and high yields are obtained over a long season.

Florida Ninety bears large fruit in Florida but, grown farther north, has small berries.

Varieties that yield large, showy fruit are Jerseybelle, Albritton, Redglow, Marshall, Midland, Fairfax, Dixieland, Catskill, Fairpeake, Shasta, and Florida Ninety.

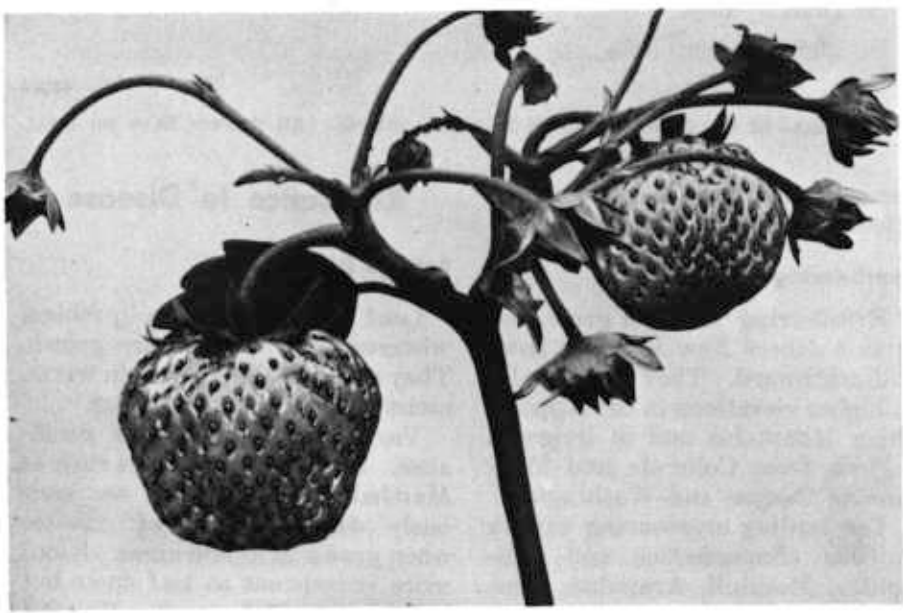
Fertility of Varieties

It is unusual for all blossoms of strawberry varieties to set fruit. Rain, frost, disease, and insect injury prevent the setting of some flowers; more important, flowers may appear normal, but have sterile pistils and produce nubbins or no fruit at all.

On an average, about one-third of the blossoms of cultivated, perfect-flowered varieties are sterile. The first flower of a cluster to open is more likely to set than later ones. The last flowers to open often are sterile. Early formed runner plants and plants spaced well apart produce fewer sterile flowers than crowded late-season plants.

In any locality, select those varieties that set the largest percentage of their flowers. A fruit cluster of the White Sugar variety is shown on this page. Only the first two flowers that opened have set, and all the others are sterile. In regions where so many flowers are sterile, this variety is not profitable.

A fruit cluster of the Klondike variety is shown on page 10. All the flowers have set. Normally,



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A fruit cluster of the perfect-flowered White Sugar variety. Two flowers have set fruit and several are sterile.

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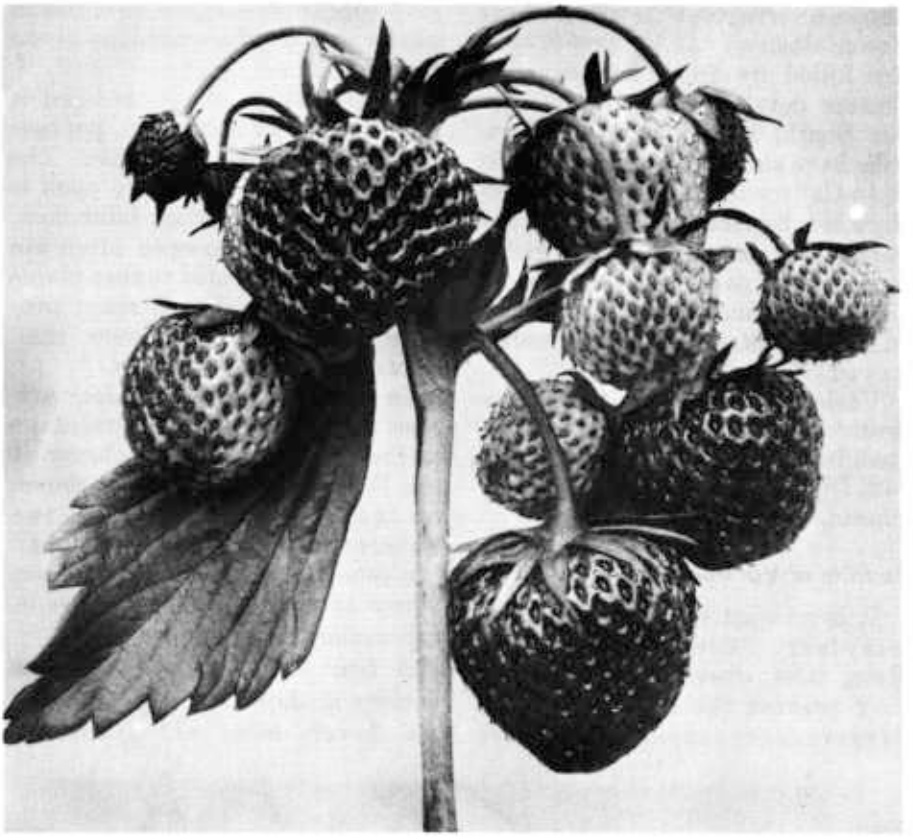

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Fruit cluster of the perfect-flowered Klondike variety. All flowers have set fruit.

some of the later flowers of the Klondike do not set fruit.

Everbearing Varieties

Everbearing varieties grow well from northern New Jersey to Iowa and northward. They succeed also at higher elevations in the Appalachian Mountains and in irrigated regions from Colorado and Montana to Oregon and Washington.

The leading everbearing variety is Gem (Superfection and Brilliant). Rockhill, Arapahoe, Mastodon, Red Rich, Streamliner, Montana Progressive, Evermore, and Twentieth Century also are everbearing varieties.

Resistance to Disease

Foliage Diseases

Leaf diseases are a problem wherever strawberries are grown. They are more destructive in warm, moist areas than in dry areas.

Varieties differ in their resistance. Susceptible varieties such as Marshall and Klondike are seriously damaged by leaf diseases when grown in humid areas. Klonmore is resistant to leaf spots but is subject to leaf scorch. Howard 17 (Premier), Fairfax, Aroma, Dorsett, Rockhill, Temple, Massey, Redstar, Tennessee Beauty, and

Midland usually are resistant to leaf diseases.

Some susceptible varieties can be grown in the Pacific Northwest because the long, dry summers discourage the development of leaf spots.

Virus Diseases

Most varieties become less vigorous and productive over a period of time. Virus diseases probably cause most of this loss of vigor, or "running out."

All varieties are susceptible to virus diseases. They infect the whole plant and all of its runner plants. Some varieties are sensitive and are weakened severely and quickly; others are more tolerant. Diseased plants do not recover.

Marshall, Catskill, Fairfax, Fairpeake, Midland, and Dorsett are sensitive to virus diseases. Northwest, Shasta, Lassen, Howard 17 (Premier), Fairland, Temple, Blakemore, and Tennessee Beauty are highly tolerant. Siletz, introduced in November 1955, is a new tolerant variety for the Pacific Northwest.

Root Diseases

Red-stele root rot is a major root disease of strawberries from Virginia to California and northward. It severely injures most varieties.

If this disease has appeared in fields with heavy soils or poorly drained sandy soils, grow only resistant varieties. Important resistant varieties are Sparkle, Temple, and Fairland.

All resistant varieties are not resistant to all strains of the disease fungus. Siletz in western Oregon

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Bed filled with seedling strawberries 3 or 4 weeks after the seed was sown. Each seedling is potentially a different variety. The seedlings will be transplanted to soil infested with red stele root rot disease. Only those resistant to the disease will be saved and fruited. The best in a fruiting test may become new varieties upon further testing.

and Stelemaster and Surecrop in Maryland are resistant to several strains that affect varieties resistant to other strains.

Another fungus disease, verticillium wilt, affects the roots, crown, and, to some extent, the leaf petioles. Most varieties are susceptible, but Blakemore and Sierra (grown in California) and Siletz (in Oregon) are highly resistant.

Home Garden Varieties

Choose strawberry varieties for the home garden according to where you live, the size of your garden, and the way you intend to use the berries. Select only one variety for a small garden.

In most of the South, home gardeners grow Blakemore, but in Tennessee, Kentucky, western Virginia, and West Virginia, Tennessee Beauty is preferred. Florida Ninety is grown in Florida, and Klonmore in Louisiana, southern Alabama, and Mississippi. In southern Texas, Missionary is preferred.

Dunlap is considered best for the upper Mississippi Valley, and Catskill is widely grown in most of the North.

In Maryland and Virginia, Midland, Pocahontas, Fairfax, Fairpeake, and Redstar are grown for table use; Dixieland, for preserving; and Midland or Dixieland, for home freezing.

In western Oregon, Narcissa, Marshall, and Corvallis are grown for table use, and Marshall or Brightmore for preserving and freezing.

Commercial Varieties

Commercial strawberry production began about 1800 near Boston, New York, Philadelphia, and Baltimore. About 1860, Wilson, a variety that shipped well, was introduced and strawberry growing became profitable in many new areas.

The industry spread with the development of fast transportation and better refrigeration. Specially adapted varieties made many regions more certain and profitable for strawberry production.

The frozen food industry has made strawberries available throughout the year; they no longer are a seasonal delicacy. In 1954 more than half the crop was frozen.

Ripening Season

For profitable commercial production, growers must select varieties that ripen when there is market demand. Some varieties produce freely in a particular locality but are commercially undesirable because of their ripening time. Although late varieties produce good crops in parts of the South, they ripen too late to compete for northern markets.

For local market production and home gardens, select varieties that have high quality and a long ripening season, or several varieties that ripen in succession. Near Washington, D. C., Midland, Pocahontas, and Fairfax are grown for the early market, and Tennessee Beauty and Armore are grown for later sale.

Shipping Varieties

Growers use certain varieties for special markets. To ship well, good commercial berries must be firm. If picked when green and immature, the fruit is firm but graded lower in appearance and general quality. Overripe berries usually are soft, moldy, or decayed when they reach the consumer.

Albritton, Dixieland, Blakemore, Tennessee Shipper, Klonmore, Klondike, Tennessee Beauty, Aroma, Missionary (from Florida), and Shasta (from California) are the best varieties for shipping to distant markets if they are adapted to the region in which they are grown.

Preserving and Ice Cream Varieties

Varieties for preserving should be easy to hull (cap), medium in size, and firm. They should have high flavor and light bright-red color that does not turn dark after preserving.

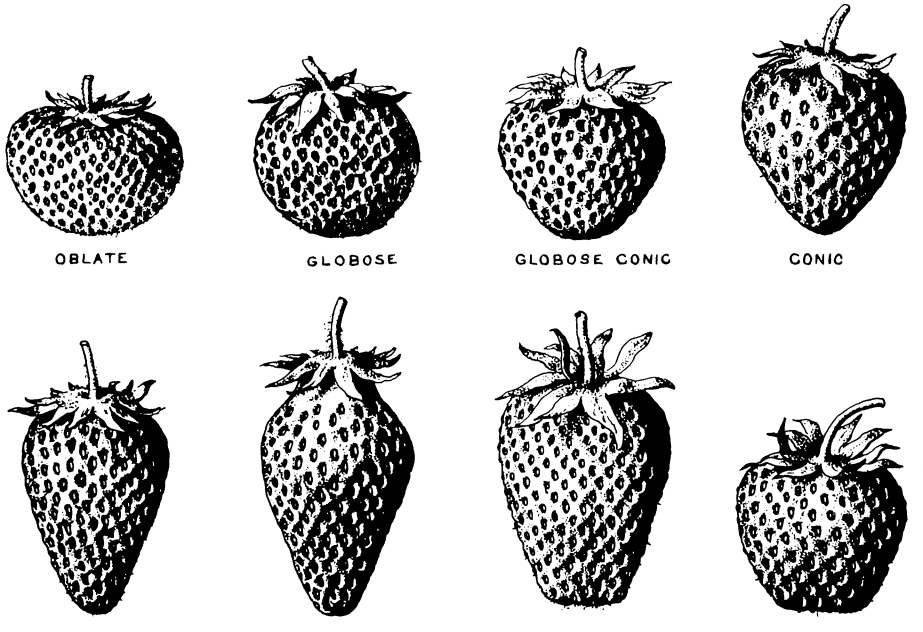
In the East, Blakemore, an older variety, and Dixieland, a new variety are the best for preserving. In the Pacific Northwest, Marshall has attained a national reputation for preserving, and Brightmore, though little grown, is excellent for preserving.

For the ice cream industry, deep-red fruit with a high flavor is desired. Marshall and Klondike are preferred, although other varieties are used.

A large percentage of the strawberries packed for preserving and for the ice cream industry are grown in Oregon, Washington, and California because of low production costs and the steady supply of berries there. Varieties used are Marshall, Northwest, and Shasta. Also, in these States more berries are commercially frozen than in other areas.

Freezing Varieties

Freezing requires deep-red high-flavored fruit. Marshall, Northwest, Dixieland, Klondike, Midland, Sparkle, and Pocahontas are considered best. Tennessee Shipper, Siletz, Tennessee Beauty, Catskill, and Blakemore are above average for freezing.



Different shapes of strawberry fruits.

Descriptions of Varieties

By referring to the descriptions that follow, and to table 1, growers can select varieties to suit their locality and purpose.

The varieties described are important and widely grown in at least one area or are tested and promising new varieties; some are grown for special purposes or particular areas. All are perfect flowering. Commercially important characteristics are mentioned. Following each name are place of origin and, where known, date of origin; where date of origin is unknown, date of introduction is given.

Albritton.—North Carolina, 1945. Berries are large, uniform, conic, and very firm. Glossy skin is bright red, flesh is red to center, and seeds are on surface. Subacid. Excellent quality. Late. Plants are vigorous and make runners freely. Albritton is well adapted for freezing. It is not productive or fully hardy in Maryland and New Jersey but develops high flavor in North Carolina.

Arapahoe.—Wyoming. Introduced 1954. Berries are medium size. Skin is tender and a rich glossy red. Flesh is red to center. Subacid. Fine flavor. Very good dessert quality. Plants are vigorous and have good runner production for an everbearer. Arapahoe is extremely hardy, even in the Great Plains.

Armore.—Missouri, 1938. Berries are large, irregular, and short wedge to blunt conic. Firmness is medum. Skin is yellowish red, and flesh is light. Good dessert quality. Late midseason. Armore has small cupped leaves that are subject to mildew and leaf spots. It is productive, runners freely, and grows best in heavy silt loam. Armore and Tennessee Beauty are replacing Aroma.

Aroma.—Kansas, 1889. Berries are attractive, medium size, and round conic to short wedge shaped. Firmness is medium. Surface is bright crimson, and flesh is light. Mildly subacid. Fair dessert quality Late. Runners freely. Chief merits are disease-resistant foilage and productivity. Fruit meets shipping and marketing requirements. Aroma has been a leading variety in Kentucky and southern Missouri; it is also grown in Illinois, Indiana, and Ohio. It adapts best to silty or clayey soils. Tennessee Beauty is partly replacing Aroma.

Blakemore.—Maryland, 1923. Berries are small, blunt conic, and firm. They have bright light-red skin and light-red flesh (that does not darken on holding), high pectin content, and are easy to hull. Acid. Fair dessert quality. Early. Plants are vigorous and make runners freely. They are highly tolerant to virus diseases, very resistant to verticillium wilt and leaf scorch, and resistant to leaf spots. Blakemore is especially desirable for preserving. It is the leading variety in the United States. It adapts to a wide range of soil types and is recommended for the region from Georgia to Virginia and westward to Oklahoma and southern Missouri.

Catskill.—New York, 1923. Berries are very large, long conic, irregular, and not firm. Fruit is attractive and has bright-crimson skin and light-red flesh. Mildly subacid. Good dessert quality. Freezes above average. Productive. Runners freely. Foliage is susceptible to leaf spots, and plants are sensitive to virus diseases. Catskill is recommended as a midseason variety for home use and local market wherever Howard 17 (Premier) is grown. It adapts to a wide range of soil types and is a good variety for New York and Michigan; in Maryland, berries have good dessert quality but are soft.

Dixieland.—Maryland, 1946. Berries are large, long blunt conic, very firm, and attractive. Skin and flesh are bright red. Acid. Fair dessert quality. Very good for freezing and preserving. Early. Foliage generally is healthy, but leaf scorch sometimes is severe. Plants make runners freely. Dixieland is a promising new variety for the Blakemore area; in Maryland, it is larger and more productive than Blakemore.

Dunlap.—Illinois, 1890. Berries are medium size, conic, and soft. They are

dark crimson, and flesh is deep red. Subacid. Very good quality. Early to midseason. Free running. Plant is hardy, drought-resistant, and tolerant to virus diseases. Foliage is susceptible to leaf spots and leaf scorch. Dunlap adapts to a wide range of soil types but thrives on clayey soil. It is grown in northern Illinois, Wisconsin, Iowa, Minnesota, Nebraska, North Dakota, and South Dakota. In the North, plants are more productive, and berries are of better dessert quality. Fruit is too soft to ship well and grown chiefly for home use and local markets. In areas where Howard 17 (Premier) is hardy, it has largely replaced Dunlap. Beaver has also replaced Dunlap to some extent.

Earlidawn.—Maryland, 1947. Berries are large, conic, somewhat irregular, medium firm. Fair dessert quality. Very early. Berries have bright, light-red skin, glossy surface, and bright-red flesh. The plants blossom early and appear as blossom-hardy to frosts as Howard 17. Plants are productive, but make fewer runners than most varieties. Earlidawn is usually resistant to leaf spots and leaf scorch, but may be sensitive to viruses. Earlidawn appears to be adapted to East Central United States and northward as an early fresh market variety.

Empire.—New York, 1940. Berries are large, attractive, and high flavored. Midseason to late. Productive. Very good dessert quality. Susceptible to leaf spots. Empire shows promise for northeastern areas but is too soft for Maryland.

Fairfax.—Maryland, 1923. Berries are medium size, attractive, and wedge to short blunt conic. Deep-red flesh is covered with brighter red skin. Berries turn dark if not picked and marketed promptly when they first ripen. Mildly subacid. Medium early. Foliage is resistant to leaf spots and leaf scorch, but plants are sensitive to virus diseases. Excellent dessert quality. Makes fewer runners than some other varieties, such as Howard 17. Plants are especially productive when late season runners are picked off. Fairfax is grown from southern New England to North Carolina and westward to Kansas.

Fairland.—Maryland, 1936. Berries are medium soft though firmer and larger than those of Howard 17 (Premier). First berries are short and blunt wedge shaped; later berries are smooth and more conic. Flesh and skin are rich red to center, and seeds are yellow. Second early. Subacid to acid. Good dessert quality. Productive. Fairland is resistant to one strain of red stele disease and highly tolerant to virus diseases. It is standard in West Virginia and western Pennsylvania.

Fairpeake. — Maryland, 1931. Berries are medium size, and wedge shaped to short blunt conic. Firmness is medium firm. Skin is light red, flesh is paler red, and seeds are yellow. Mildly subacid. Late. Excellent dessert quality. Foliage is resistant to leaf spots and leaf scorch, but plants are susceptible to virus diseases. Fairpeake makes runners somewhat freely. It is recommended for southern New England to North Carolina and west to Kansas.

Florida Ninety.—Florida, 1947. Berries are soft, irregular, and long conic. In Florida they are very large and second early. Good dessert quality. Productive. Florida Ninety grows more runner plants than any other variety, but it is very subject to leaf spots and leaf scorch. It is adapted to central Florida.

Gem (Superfection, Brilliant).—Michigan, 1933. Berries are soft, small, and irregular short wedge to oblate shape. Surface is a glossy deep red, and center is paler red. Acid. Good dessert quality. Gem is susceptible to leaf spots and resistant to leaf scorch. It is the leading everbearer.

Howard 17 (Premier).—Massachusetts. Introduced 1918. Berries are medium size, long conic, and good quality. Both skin and flesh are red. Subacid. Early with long season. Fruit is not firm enough to ship to distant markets. Plants are productive and generally make runners freely. Howard 17 is resistant to leaf diseases and is highly tolerant to virus diseases. It is widely grown in the North but has been replaced by

TABLE 1.—*Some characteristics of 33 strawberry varieties in the areas to which each variety is best adapted*

Variety	Plant characteristics[1]			Fruit characteristics[1]				
	Leaf spot resistance	Leaf scorch resistance	Response to virus	Season: Days after Midland	Size	Firmness	Dessert quality	Processing quality for freezing
Albritton		Susceptible		12	Large	Very firm	Excellent	Good.
Armore	Susceptible			10	Large	Medium	Good	Fair.
Aroma	Resistant	Partial	Tolerant	12	Medium	Medium	Fair	Poor.
Blakemore	Resistant	Very resistant	Very tolerant	3	Small	Firm	Fair	Good.
Catskill	Susceptible	Partial	Very susceptible.	7	Very large	Soft	Good	Good.
Dixieland	Partial	Partial		3	Large	Very firm	Fair	Very good.
Dunlap	Susceptible		Tolerant	6	Medium	Soft	Very good	Fair.
Earlidawn	Resistant	Resistant	Susceptible	0	Large	Medium	Fair	Good.
Empire	Susceptible			8	Large	Soft	Very good	
Fairfax	Resistant	Resistant	Susceptible	6	Medium	Medium	Excellent	Fair.
Fairland	Partial	Susceptible	Very tolerant	6	Large	Medium soft.	Good	Fair.
Fairpeake	Resistant	Resistant	Susceptible	14	Medium	Medium firm.	Excellent	Poor.
Florida Ninety	Very susceptible.	Very susceptible.		5	Very large	Soft	Good	Good.
Gem	Susceptible	Resistant		0	Small	Soft	Good	Good.
Howard 17 (Premier).	Resistant	Resistant	Tolerant	3	Medium	Soft	Good	Poor.
Klondike	Susceptible	Susceptible	Very tolerant	6	Small	Medium	Fair	Very good.
Klonmore	Very resistant	Very susceptible.	Tolerant	3	Small	Medium	Fair	Good.
Lassen			Very tolerant	7	Very large	Soft	Fair	Poor.
Marshall	Susceptible	Susceptible	Very susceptible.	7	Large	Soft	Excellent	Very good.

Midland	Resistant	Resistant	Susceptible		Large	Medium	Excellent	Good.
Missionary	Resistant	Partial	Tolerant	5	Small	Medium	Fair	Good.
Northwest			Tolerant	12	Medium	Medium	Very good	Very good.
Pocahontas	Partial	Resistant		6	Large	Medium	Good	Very good.
Redstar	Resistant	Resistant	Tolerant	18	Large	Medium	Good	Good.
Robinson	Partial	Susceptible	Tolerant	10	Large	Soft	Fair	Poor.
Shasta	Susceptible		Tolerant	7	Very large	Medium	Good	Good.
Sioux				3	Small	Soft	Very good	Good.
Siletz			Tolerant	0	Large	Medium	Very good	Very good.
Sparkle	Partial		Susceptible	12	Small-medium.	Soft	Very good	Very good.
Stelemaster	Susceptible	Susceptible		2	Medium	Medium	Good	Fair.
Temple	Resistant	Resistant	Very tolerant	6	Large	Medium firm.	Very good	Poor.
Tennessee Beauty	Resistant	Resistant	Tolerant	12	Medium	Firm	Good	Very good.
Vermilion	Resistant	Resistant		6	Large	Soft	Good	Fair.

[1] Omission of a term indicates lack of opportunity to observe the characteristic.

Blakemore in Maryland and Delaware; to some extent farther north, it has been replaced by Catskill, Sparkle, and Robinson.

Klondike.—Louisiana, 1896. Berries are small and round or round conic; in California they are necked. Color is deep crimson to center. Firmness is medium. Acid. Fair to good dessert quality. Very good for freezing. Early midseason. Runners freely. Foliage is subject to leaf spots and leaf scorch, but plants are very tolerant to virus diseases Klondike has been largely replaced by Klonmore but still is grown around Hammond, La. Although not easy to hull, Klondike is one of the best varieties for the ice cream trade.

Klonmore.—Louisiana, 1933. Berries are small, blunt conic, a light bright red, and have yellow seeds. Firmness is medium. Subacid. Early. Fair to medium dessert quality. Good freezing quality. Foliage is vigorous, and plants make runners freely. Klonmore has replaced Klondike in about 75 percent of the strawberry acreage in Louisiana; it is earlier and much more resistant to leaf spots. However, it is too small and too subject to leaf scorch to grow farther north.

Lassen.—California, 1936. Berries are very large. Fair dessert quality. Fruit is too soft for shipping and not good for freezing. It is an extremely productive, vigorous variety. Plants are highly tolerant to virus diseases. Lassen is one of the principal varieties of California; along the coast, it bears heavily from April to November. Lassen requires only a short rest period, which make it particularly adaptable to southern California.

Marshall (Banner, Oregon).—Massachusetts, 1890. Berries are large, irregular, soft, and round conic to conic. Skin is deep crimson, and flesh is deep red. Mildly subacid. Midseason. Drought-resistant. When grown in the North, Marshall is the established standard for excellence in dessert quality, is very good for preserving, and is preferred for the ice cream industry. Plants make runners somewhat freely and are especially adapted to heavy soils. Marshall is not desirable in the East because foliage is too susceptible to leaf spots It is also very sensitive to virus diseases. Marshall is still the leading variety in western Oregon and western Washington where it is grown extensively for freezing.

Midland.—Maryland, 1929. Berries large, round conic, irregular, and high flavored. Firmness is medium. Glossy surface and flesh are deep red. Early. Mildly subacid. Midland has very good to excellent dessert fruit and freezes well. Plants are productive but make fewer runners than most varieties. Midland usually is resistant to leaf spots and leaf scorch but is sensitive to virus diseases. It yields well when irrigated and grown in fertile soil or in the hill system. It is popular from southern New England to Virginia and west to Iowa and Kansas.

Missionary.—Virginia, 1900. Berries are small to medium size, conic, and dark crimson. Flesh is deep red. Fruit is soft to firm according to the section in which it is grown. Acid. Fair to good quality. Early. Foliage is fairly resistant to leaf spots. Plants runner freely. Florida-grown berries are firm, attractive, excellent for shipping, and good for freezing. Missionary and Florida Ninety are the chief varieties in Florida.

Northwest.—Washington, 1941. Berries are medium size, uniform, and long blunt conic. Firmness is medium. Glossy surface is bright crimson. Flesh is red. Subacid. Very good dessert quality. Very good for freezing. Late. Plants are tolerant to virus diseases but susceptible to leaf spots. Northwest ripens about 1 week after Marshall and is replacing it to some extent in Washington and Oregon.

Pocahontas.—Maryland, 1946. Berries are large, attractive, and blunt conic. Firmness is medium. Skin is bright medium red. Flesh is red. Subacid. Good dessert quality. Second early. Very good for freezing. Foliage generally is resistant to leaf scorch and par-

tially resistant to leaf spots in South. Plants are vigorous and make runners freely. Pocahontas is a productive new variety for the northern Blakemore area. It also shows promise for fall planting and spring fruiting in the Norfolk, Va., area.

Premier.—Another name for Howard 17.

Red Rich.—Minnesota, 1938. Berries are large to small, irregular, and short conic. Color is an attractive rich red Subacid. Excellent flavor. Everbearing. Foliage is resistant to leaf spots and leaf scorch. Red Rich is adapted to Northern States.

Redstar.—Maryland, 1931. Berries are large, irregular, blunt conic, and medium red. Firmness is medium. Subacid. Good to very good dessert quality. Very late. Leaves are large and resistant to leaf spots and leaf scorch. Plants are tolerant to virus diseases and make runners freely. Redstar is one of the better late varieties grown from Maryland to southern New England and west to Missouri and Iowa.

Robinson (Kardinal King, Scarlet Beauty).—Michigan, 1932. Berries are soft, conic, and red. Flesh is lighter red. Late. Mild flavor. Not adapted to freezing. Plants are small and make runners freely. They are partially resistant to leaf spots, susceptible to leaf scorch, and tolerant to virus diseases. Robinson is noted for its productivity and large berries. In New York and Michigan, it develops firmer fruit than it does farther south.

Rockhill (Wazata).—Iowa, 1918. Berries are irregular and round conic to short wedge shaped. Firmness is medium. Skin is bright rich red, and flesh is light red. Subacid. Excellent quality. Everbearing. Foliage is dark green and healthy. Plants make few runners and may be propagated by crown division. Rockhill is grown in Oregon, Minnesota, Iowa, and neighboring States for its large size, attractive appearance, and excellent flavor.

Shasta.—California, 1935. Berries are very large and round conic. Firmness is medium. They have light-red skin, pale flesh, and yellow seeds. Mild subacid. Good dessert quality. Midseason. Runners freely. Plants are vigorous and tolerant to virus diseases, but foliage is subject to leaf spots in Eastern States. Shasta is the leading variety of California; near the coast it yields berries continuously from April to November.

Siletz.—Oregon, 1947. Berries are medium in size, blunt conic, dark red. Firmness is medium to soft. Very good dessert quality. Plants make runners very freely where adapted. Siletz is adapted to the Pacific Northwest.

Sioux.—Wyoming. Introduced 1948. Berries are small, long conic, soft, and deep red. Flesh is light red. Seeds are yellow. Mildly subacid. Very good dessert quality. Good freezing quality. Early. Foliage is healthy and resembles that of Howard 17 (Premier). Plants make runners freely. Sioux is a hardy productive variety for the area of Nebraska and Colorado to North Dakota. Though small, it is probably the largest of the varieties bred to withstand low temperatures. In the East, it is too small.

Sparkle (Paymaster).—New Jersey, 1931. Berries are short blunt conic to oblate, soft, and glossy rich red. Fruit is usually medium size but sometimes small. Mildly subacid. Very good dessert quality. Very good for freezing. Leaves are average size. Plants make runners very freely. Sparkle is resistant to one strain of red stele disease, partially resistant to leaf spots, and susceptible to virus diseases. It is a productive late variety for the northeastern States.

Stelemaster.—Maryland, 1950. Berries are medium in size, firm. Good dessert quality. Skin is bright red with medium-glossy surface and light-red flesh. Plants are susceptible to leaf spot and leaf scorch, but highly resistant to 4 races of red stele root rot. Blossoms are susceptible to frost during bloom. Stelemaster is useful in soils contaminated with races of red stele that infect other resistant varieties.

Temple.—Maryland, 1937. Berries are large, necked, regular, and blunt conic.

Firmness is medium firm. Color is medium red. Mildly subacid. Early midseason. Very good dessert quality. High flavored. Runners freely. Foliage is vigorous. Plants are highly tolerant to virus diseases, resistant to one strain of red stele disease, and highly resistant to leaf spots. Temple grows well on Delmarva Peninsula (eastern shore of Delaware, Maryland, and Virginia) and in New York, Ohio, and New England States. Sometimes on high lands dead caps are serious.

Tennessee Beauty.—Tennessee, 1933. Berries are attractive, uniform, medium size, and long conic. Color is a glossy medium to deep red. Mildly subacid. Good dessert quality. Good freezing quality. Late midseason. Large caps. Runners freely. Leaves are average size. Plants are resistant to leaf spots and leaf scorch and are tolerant to virus diseases. Because of its productivity, firmness, color, and flavor, Tennessee Beauty is becoming a leading variety in the Missouri to Maryland area.

Vermilion.—Illinois, 1946. Berries are large, irregular, short blunt conic, and soft. Skin is bright vermilion red, and flesh is pale. Seeds are yellow. Subacid. Good to excellent quality. Midseason. Productive. Runners freely. Foliage is vigorous. Plants are resistant to red stele disease and leaf spots.

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